CLAIMS

What is claimed is:

1. An analog front end apparatus, comprising:

a) a transmit block coupled to transmit discrete multitone modulated upstream data to a subscriber line;

b) a hybrid network coupled to the subscriber line and the transmit block; and

c) a receive block coupled to the hybrid for receiving discrete multitone modulated downstream data from the subscriber line, wherein the transmit block, hybrid network, and receive block reside within a same integrated circuit package.

2. The apparatus of claim 1 wherein the hybrid is a first order hybrid network.

3. The apparatus of claim 1 wherein the hybrid is tunable.

4. The apparatus of claim 1 wherein the hybrid is DC isolated from the transmit and receive blocks of the analog front end.

5. The apparatus of claim 1 wherein the transmit block further comprises:

i) a first interpolator coupled to interpolate the upstream data from a first clock rate to a second clock rate greater than the first clock rate;

ii) a power spectral density shaping filter coupled to shape the power spectrum of the interpolated upstream data; and

iii) a second interpolator coupled to interpolate the shaped signal to a third clock rate greater than the second clock rate.

6. The apparatus of claim 1 wherein the transmit block, hybrid network, and receive block are fabricated on a same integrated substrate to form a complementary metal oxide semiconductor (CMOS) integrated circuit.

7. A method comprising the steps of:

a) receiving a discrete multitone modulated upstream data signal at a first clock rate, *c1*;

b) interpolating the upstream signal to a second clock rate $c2 > c1$.

c) processing the interpolated signal through a power shaping power spectral density shaping filter;

d) interpolating the power shaped signal to a third clock rate $c3 > c2$; and

e) converting the twice interpolated signal to an analog signal.

8. The method of claim 7 further comprising the step of pre-processing the received upstream data signal to substantially eliminate even images.

9. The method of claim 5 wherein $c2 = 1.104$ MHz.

10. The method of claim 5 wherein $c3 = 35.328$ MHz.

11. A method comprising the steps of:

a) passing a composite signal containing discrete multitone modulated upstream and downstream data signals through a hybrid to extract the downstream data signal;

b) filtering the composite signal through a high pass filter having a corner frequency, f1;

c) filtering the high pass filtered signal through a low pass filter having a corner frequency f2 > f1; and

d) converting the twice filtered downstream data signal to a digital signal.

12. The method of claim 11 further comprising the steps of:

e) decimating the digital signal from a first rate *c1* to a second rate *c2*, wherein *c2<c1*;

f) filtering the decimated signal with an anti-aliasing low pass filter;

g) decimating the anti-aliased signal to a third rate c3; and

h) filtering the twice decimated signal with second high pass filter.

13. The method of claim 12 wherein *c2* = 8.836 MHz.

14. The method of claim 12 wherein *c3* = 2.208 MHz.